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AUTHOR Reuman, David A.
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ABSTRACT

Systematic changes in their classroom environments occur when students make the transition from upper-elementary to junior high school. Students typically experience a transition from a self-contained classroom to departmentalized instruction in junior high school; they often also experience a transition from heterogeneous to homogeneous, ability-grouped classrooms in junior high school. Effects of these environmental changes on students' social comparison of abilities and achievement-related beliefs and values in mathematics are examined for a sample of 291 students in 14 upper-elementary and junior high school classrooms. Certain social comparison behaviors increase when the school transition occurs and are higher in heterogeneous compared to homogeneous, ability-grouped junior high school classrooms. Other social comparison behaviors are affected in quite different ways at the school transition. Self-concept of math ability and math value decline at the school transition. Implications of these trends for long-term persistence in mathematics and suggestions for future research are discussed. (Author)

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Consequences of the Transition into Junior High School on Social Comparison of Abilities and Achievement Motivation

David A. Reuman

The University of Michigan

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Abstract

Systematic changes in their classroom environments occur when students make the transition from upper-elementary to junior high school. Students typically experience a transition from a self-contained classroom to departmentalized instruction in junior high school; they often also experience a transition from heterogeneous to homogeneous, ability-grouped classrooms in junior high school. Effects of these environmental changes on students' social comparison of abilities and achievement-related beliefs and values in mathematics are exami for a sample of 291 students in 14 upper-elementary and junior high school classrooms. Certain social comparison behaviors increase when the school transition occurs and are higher in heterogeneous compared to homogeneous, ability-grouped junior high school classrooms. Other social comparison behaviors are affected in quite different ways at the school transition. Self-concept of math ability and math value decline at the school transition. Implications of these trends for long-term persistence in mathematics and suggestions for future research are discussed.

Students experience many systematic changes in their classroom environments when they make the transition from an upper elementary classroom to junior high school (Brophy & Evertson, 1978; Eccles, Midgley, & Adler, in press). Typically, students experience a transition from an elementary school classroom taught by a single teacher to a junior high school with departmentalized instruction. In addition, students frequently experience a transition from elementary schools where students are not assigned to separate classrooms on the basis of ability to junior high schools where between-classroom grouping by ability is practiced. Effects of these environmental changes on students' social comparison of abilities and achievement-related beliefs and values in mathematics will be examined here.

Effects of the school transition on social comparison of abilities

When entrance into junior high school marks a transition from a self-contained elementary classroom to a junior high school where different teachers instruct students in different subject areas, increased social comparison of abilities among students may be expected in junior high school. This increase in social comparison may be expected because of new student-teacher relationships and new student-peer relationships in junior high school.

In the first place, compared to teachers in a non-departmentalized elementary school, teachers in a departmentalized junior high school have contact with many more students during a school day. Junior high school teachers may be less familiar with their students individually. Blyth, Simmons, and Bush (1978) noted an increase in students' perceived anonymity at school that coincides with the transition into junior high school. The demands of teaching and evaluating many more students in a single academic domain, while simultaneously being less familiar with their individual backgrounds and interests, will presumably shape the instructional and grading practices used by junior high school teachers. While some degree of individualized instruction (or within-classroom ability grouping) is fairly common during the elementary school years, instruction in junior high school is more often characterized by a whole-class format. As a consequence, junior high school teachers are more likely to evaluate their students according to normative performance within a classroom rather than individual progress or effort criteria (Gronlund, 1974; Rosenholtz & Rosenholtz, 1981). Junior high school teachers who evaluate their students using normative performance standards may condition their students to engage in social comparison for self-evaluation.

Entering a new environment at junior high school should heighten students' uncertainties about their performance in new social and academic roles. To reduce these heightened

uncertainties, students may increase their social comparison behavior (Festinger, 1954). From a student's perspective, entering a new school environment at junior high school may make it difficult to interpret current math performance outcomes by comparing them to past performance outcomes in elementary school. Although many early adolescents are capable of self-evaluation through both autonomous achievement standards (e.g., own past performance) and social comparison achievement standards (Suls & Sanders, 1982; Veroff, 1969), students who have recently made a school transition may discount their elementary school experiences as irrelevant for current self-evaluation and rely more heavily on social comparison information in their junior high school classrooms.

Whereas the transition into new classroom environments at junior high school can be expected to increase students' social comparison of abilities generally, the transition from heterogeneous elementary classrooms to homogeneous, ability-grouped junior high school classrooms can be expected to inhibit this increase. There are two lines of argument for expecting lower social comparison of abilities in homogeneous classrooms, to which students have been assigned on the basis of prior performance in a subject area.

Festinger (1954) has argued that there exists a human drive to obtain accurate information about one's abilities and that people gather this information through social

comparison. One of the key determinants of engaging in social comparison, in his analysis, is uncertainty about one's ability. To the extent that a student feels uncertain, there will exist a drive to reduce the uncertainty through social comparison. Homogeneous ability-grouped classrooms, where students have been assigned on the basis of past performance in an academic subject, have already reduced much of the uncertainty about one's ability and should therefore remove much of the motivation to engage in social comparison. Uncertainty about one's ability should be most acutely reduced if the student perceives that ability-based classroom assignments are relatively permanent. To the extent that stable ability-grouping practices are more common in junior high schools than in elementary schools, social comparison of abilities should be reduced.

Homogeneous ability-grouped classrooms should also generate less social comparison of abilities because of the lower diagnostic value of social comparison information obtained within such classrooms. Trope (1975, 1979, 1980, 1982; Trope & Ben-Yair, 1982; Trope & Brickman, 1975) has argued that people are motivated to select and persist on tasks that are diagnostic of their ability. His concept of diagnosticity assumes that ability inferences are made by comparing one's own performance outcomes with other members of one's reference group. If everyone's grade on a math test is nearly the same, the test is not obviously

diagnostic of math ability. To the extent that different students receive different grades, the test can be diagnostic of ability (and of effort). Heterogeneous classrooms provide more diagnostic performance outcomes on the whole, precisely because the range of performance outcomes in such classrooms is much broader than in homogeneous ability-grouped classrooms. In heterogeneous classrooms social comparison becomes an effective means for making ability self-assessments. Because the incidence of between-classroom ability grouping increases in junior high school, and students' most visible reference groups are therefore more homogeneous, social comparison behavior would be expected to diminish in homogeneous junior high school classrooms.

Finally, there is reason to expect a positive relationship (in schools that practice between-classroom grouping by ability) between classroom ability-level and frequency of social classroom behavior. By making performance comparisons with their classmates, students at the upper end of an ability distribution can both gain information about their ability and maintain a favorable self-presentation (Gruder, 1977; Tesser & Campbell, 1982). High ability students run the risk of embarrassing others in this social comparison process (Brickman & Bulman, 1977); however, the pressure to avoid social comparison should be greater for low-ability students who run the risk of embarrassing themselves whenever they make performance

comparisons. If they do not avoid social comparison altogether, low-ability students can perhaps minimize negative self-evaluation by comparing themselves with their classmates on a performance dimension (e.g., speed of performance) that is not manifestly diagnostic of personal competence.

To the extent that an ability dimension is important to students, they can be expected to value self-evaluation on that ability dimension. If one assumes that students in high-ability classrooms tend to value their academic subjects more, then they can be expected to engage in more self-evaluation. Of course, valuing ability in an academic subject may imply valuing self-evaluation on that ability dimension without implying greater social comparison behavior. Some students may perceive social comparison as irrelevant to self-evaluation of an ability (Levine, 1983). Students may instead use autonomous self-evaluation standards (Suls & Sanders, 1982; Veroff, 1969). Nevertheless, the most parsimonious hypothesis would be that both types of self-evaluation increase as classroom ability-level (and presumably the perceived value of academic subjects) increases.

In summary, social comparison of abilities is expected to increase as students make the transition from self-contained elementary classrooms to departmentalized junior high schools. This general increase should be offset to some degree for students who make a transition from

heterogeneous elementary classrooms to homogeneous ability-grouped junior high school classrooms. Finally, within the junior high schools that practice between-classroom grouping by ability, a positive relationship between classroom ability level and frequency of social comparison behavior is expected.

Effects of the school transition on achievement-related beliefs and values

Eccles, Midgley, and Adler (in press) review several studies that demonstrate (1) declines in students' achievement-related beliefs and values from upper-elementary school years onward, (2) particularly steep declines when students make the transition from elementary school to junior high school, and (3) specificity of these effects to mathematics but not to English subject areas. For instance, Brush (1980) and Eccles, Adler, Futterman, Goff, Kaczala, Meece, and Midgley (1983) document sharp declines associated with the transition into junior high school for math task value and confidence in one's ability in math, but no similar declines in English. Eccles et al. (in press) suggest that this pattern of effects cannot be adequately explained by cognitive-maturational factors; systematic grade-related changes in the classroom environment must be taken into account. In particular, Eccles and her colleagues suggest that a heightened emphasis on ability self-assessment in junior high school classrooms is

responsible for observed declines in math value and self-concept of math ability.

The transition from elementary school to junior high school frequently involves a transition from a school that does not practice between-classroom grouping by ability to a school that does. In a meta-analysis of research on between-classroom ability grouping at the secondary school level, Kulik and Kulik (1982) conclude that homogeneous, ability-grouped classrooms do not differ from heterogeneous classrooms in their effects on students' self-concept of ability, though students in ability-grouped classes do develop more positive attitudes toward the subjects they are studying. Reuman, Miller, and Eccles (1983) have argued that meaningful relationships between ability grouping and self-concept of ability will be missed by aggregating homogeneous classrooms that vary in ability level, as Kulik and Kulik (1982) did.

In addition to individual differences in motivation to evaluate one's own abilities through social comparison, the nature of the reference group used in this evaluation process will determine how favorable one's self-evaluation will be. Schools without between-classroom ability grouping practices create more heterogeneous classroom reference groups than schools with between-classroom ability grouping. Students in heterogeneous classrooms may be encouraged to compare themselves with others who are more diverse in ability within their own classroom. High ability students

in heterogeneous classrooms may compare themselves with substantially less able students and exaggerate how capable they themselves are; low ability students in heterogeneous classrooms may compare themselves with substantially more able students and exaggerate how incapable they themselves are. Similarly, high-ability students in homogeneous, ability-grouped classrooms may unduly lower their self-concept of ability to the extent that they evaluate themselves in comparison to their very talented classmates. Low-ability students in homogeneous, ability-grouped classrooms may raise their self-concept of math ability to the extent that they evaluate themselves in comparison to their not-so-talented classmates. In sum, high-ability students in homogeneous, ability-grouped classrooms may have lower self-concepts of ability than equally high-ability students in heterogeneous classrooms, whereas low-ability students in homogeneous, ability-grouped classrooms may have higher self-concepts of ability than equally low-ability students in heterogeneous classrooms. After aggregating over ability levels, no overall mean difference in self-concept of ability between homogeneous and heterogeneous classrooms would be observed, whereas according to the present analysis it would clearly be incorrect to conclude that between-classroom ability grouping had no effect on self-concept of ability.

In summary, self-concept of math ability and math task value are expected to decline from upper elementary school

to junior high school (due to increased emphasis on self-evaluation). Controlling for grade level and aggregating over homogeneous classrooms that vary in ability level, self-concept of ability should not differ for homogeneous- versus heterogeneous-ability classrooms; however, within schools that practice between-classroom grouping by ability, classroom ability level should be positively related to math value and self-concept of math ability.

Method

Sample

This sample includes 291 students in 14 classrooms. Two of the 14 classrooms consist of fourth and fifth graders, two classrooms consist of only fifth graders, nine classrooms consist of seventh graders, and one classroom consists of eighth-graders. All students participated on a voluntary basis. The 291 students represent 74 percent of the students enrolled in these 14 classrooms.

The classrooms were drawn from two public school districts in southeastern Michigan. In both districts students make a transition into junior high school at seventh grade. In both districts, departmentalized instruction in mathematics begins at seventh grade. The two districts differ with respect to their ability-grouping practices in mathematics at the junior high school level. One district assigns students to separate math classrooms in junior high school on the basis of students' past

performance in math. Students in this district are assigned either to homogeneous "high ability", "regular ability", or "low ability" classrooms. By contrast, the second school district has no policy for assigning junior high school students to separate classrooms on the basis of prior academic performance. The absence of a policy for assigning students to separate classrooms is indicated by calling such classrooms heterogeneous in ability. In the 14 classrooms in this sample, no teacher separated students into distinct ability groups within a classroom. Table 1 shows the number of participants in the sample according to grade level (aggregated to distinguish simply "upper elementary" versus "junior high" school classrooms), student sex, and between-classroom ability-grouping practices used in math.

Questionnaire administration

Survey questionnaires were administered to students in their classrooms during the time they normally would have had mathematics instruction. Because data relevant to a large number of constructs were to be collected, three forms of the student questionnaire were developed. Certain items appeared on all three forms; other items appeared on two or one of the forms. The forms were randomly distributed within each classroom, such that at least a third of each class responded to each item.

The questionnaire included eight indicators of within-classroom social comparison and competition in math (see Table 2). The questionnaire also included four indicators

of self-concept of math ability and three indicators of math value (see Table 3).

Results

Construction of composite measures: Social comparison and competition in math

A principal components analysis of the eight indicators of social comparison and competition in math yielded three characteristic roots greater than 1.00. Both Kaiser's criterion (Kaiser, 1970) and a scree test (Cattell, 1966; Cattell & Jaspers, 1967) suggested empirical differentiation of three sets of items. Three factors were therefore extracted in a subsequent common factor analysis and rotated both to a VARIMAX and to an OBLIMIN solution. Because correlations among common factors in the OBLIMIN solution were not significantly different from zero, the VARIMAX-rotated factor structure was chosen as the basis for constructing composite measures. The 3-factor model of these indicators of within-classroom social comparison and competition displays simple structure.

The two items that load univocally on Factor I (see Table 2) both tap the frequency with which students make comparisons of performance outcomes. The three items that load univocally on Factor II suggest a dimension of interpersonal competition in math. These items tap rivalry based on speed of performance. Finally, the three items that load univocally on Factor III suggest a dimension of students' investment in outperforming their classmates in

math. These items share an emphasis on the demonstration of superior personal competence and effort. Unit-weighted composites were constructed for the items that load at or above .40 on each factor. Correlations between Factors I through III and their corresponding unit-weighted composites are .986, .992, and .998, respectively. This degree of empirical covariation between factor scores and unit-weighted composites, as well as the expectation that findings based on unit-weighted composites will suffer less shrinkage in replication studies (Dawes & Corrigan, 1974), prompt the decision to analyze unit-weighted composites representing these three dimensions of social comparison and competition in math.[1]

Analysis plan

Using effect coding, one dummy variable was created for sex (S: coded 1 if female and -1 if male), and four dummy variables were created for the five categories of grade level and grouping (G1: coded 1 if a student is placed in a heterogeneous upper-elementary classroom, -1 if placed in a homogeneous "high ability" junior high school classroom, and 0 otherwise; G2: coded 1 if a student is placed in a heterogeneous junior high school classroom, -1 if placed in a homogeneous "high ability" junior high school classroom, and 0 otherwise; G3: coded 1 if a student is placed in a homogeneous "low ability" junior high school classroom, -1 if placed in a homogeneous "high ability" junior high school classroom, and 0 otherwise; and G4, coded 1 if a student is

placed in a homogeneous "regular ability" junior high school classroom, -1 if placed in a homogeneous "high ability" junior high school classroom and 0 otherwise). Cross-products of these variables were computed to capture interaction effects.

Beginning with the saturated model that included all possible linear effects of sex, grade level/grouping, and their cross-products on a dependent variable, a stepwise multiple regression procedure with backward elimination of terms was performed. Non-significant terms ($p \geq .05$) were trimmed from the model, with the constraint that any lower-order term nested in a significant higher-order term would be retained, regardless of its own p-value. Because the independent variables were created with effect coding, significant terms in a trimmed regression model may be interpreted as significant deviations of that predictor category from the grand mean of the dependent variable for the sample.

Antecedents of social comparison and competition in math

This procedure led to the following trimmed regression model when "Compare math papers and report cards" is the dependent variable:

Predicted values of "Compare math papers and report cards" =

$$-.43^{***}G1 + .32^{***}G2. \qquad (1)$$

R-squared for this model is .186 (overall N = 261. Coefficients are betas; one-, two-, or three asterisks

following a coefficient denote p-values less than or equal to .05, .01, and .001, respectively.) Mean predicted values derived from this standardized regression equation are displayed in Table 4A. Coefficients in Table 4A may be read as mean standard score deviations from the grand mean of the dependent variable.

The pattern of social comparison behavior shown in Table 4A is consistent with hypothesized effects of the transition into junior high school and between-classroom ability grouping practices. First, social comparison behavior increases from upper-elementary classrooms to junior high school. Second, this increase is more pronounced for students who continue into heterogeneous classrooms in junior high school, than for students who enter homogeneous, ability-grouped classrooms. (Alternatively, one might say that junior high school students engage in more social comparison in heterogeneous classrooms than in homogeneous, ability-grouped classrooms). Finally, within homogeneous junior high school classrooms there is a weak positive relationship between classroom ability-level and frequency of social comparison among students.

The same analysis strategy led to the following trimmed regression model when "Competition" is the dependent variable:

Predicted values of "Competition" =

$$-.18^{**}S + .16*G1 - .16*G2 + .32^{***}G3. \qquad (2)$$

R-squared for this model is .196 (overall N = 233). Mean predicted values derived from this standardized regression equation are displayed in Table 4B.

The pattern of competitive behavior shown in Table 4B is quite unlike the pattern of social comparison behavior in Table 4A. First, boys are significantly more likely than girls to say that competition occurs frequently in their classrooms. It may be that boys are more likely to characterize their classrooms this way because they themselves are either the perpetrators or the targets of such competitive acts. It is also evident in Table 4B that competition is inversely related to classroom ability-level in junior high schools that practice between-classroom ability grouping. Finally, competition shows a grade-related decline, especially within heterogeneous classrooms. One might suppose that older students in this sample, as well as students in high-ability classrooms, are more likely to believe that relative speed is not a reliable indicator of relative competence in problem-solving.

The trimmed regression model for predicting "Investment in outperforming classmates" is:

Predicted values of "Investment in outperforming classmates" =

$$.10S + .05G2 - .24^{**}SxG2. \qquad (3)$$

R-squared for this model is .050 (overall N = 168). Mean predicted values derived from this equation are shown in Table 4C.

The sex by ability-grouping interaction may be described in two ways. Girls in homogeneous high-ability classrooms are more likely than boys in the same classrooms to say they are invested in outperforming their (high-ability) classmates. Alternatively, boys in heterogeneous classrooms are more likely than girls in the same classrooms to say they are invested in outperforming their (heterogeneous ability) classmates. High-ability junior high school girls in this sample are setting a more difficult level of aspiration for themselves than are high-ability junior high school boys. By trying to outperform other high achievers, these girls may be more likely to experience disappointment. As was the case with "Competition", the antecedents of "Investment in outperforming classmates" differ markedly from the antecedents of "Compare math papers and report cards".

Construction of composite measures: Self-concept of math ability and math task value

A principal components analysis of the seven indicators of self-concept of math ability and math value yielded two characteristic roots greater than 1.00. Both Kaiser's criterion and a scree test suggested empirical differentiation of two sets of items. Two factors were therefore extracted in a common factor analysis and allowed to rotate to an OBLIMIN solution.

Four items load univocally (greater than .400) on Factor I, which will be named "Self-concept of math

ability"; three items load univocally on Factor II, named "Math value" (see Table 3). The correlation between these two primary factors is .22. Correlations between Factors I and II and corresponding unit-weighted composites are .992 and .980. Because of this substantial covariation, the unit-weighted composites representing "Self-concept of math ability" and "Math value" will be used as dependent variables in the regression analyses that follow.[1]

Antecedents of "Self-concept of math ability" and "Math value"

When "Self-concept of math ability" is analyzed as a function of grade level, ability-grouping in math, and student sex, the following trimmed regression model results:

Predicted values of "Self-concept of math ability" =

.22*G1 - .27**G4. (4)

R-squared for this model is .054 (overall N = 161). Mean predicted values derived from this standardized regression equation are displayed in Table 5A.

The pattern of "Self-concept of math ability" seen in Table 5A is consistent with two hypotheses and inconsistent with respect to the third. As expected, "Self-concept of math ability" declines from upper-elementary classrooms to junior high school. Also as expected there is no apparent mean difference in "Self-concept" between junior high school students, when students are grossly aggregated into heterogeneous versus homogeneous classrooms. Contrary to expectation, there is no evidence of a positive relationship

between classroom ability-level and "Self-concept of math ability". Students in low-ability junior high school classrooms may not show lower "Self-concept of math ability" than other homogeneously grouped junior high school students because of differential selection factors operating with this sample. The overall participation rate in these homogeneous, low-ability classrooms was 60 percent, compared to a 74 percent participation rate for the sample as a whole. It is possible that only the most self-assured students in low-ability classrooms would volunteer to participate in a study that examined their academic weaknesses.

When "Math value" is analyzed as a function of grade level, ability-grouping in math, and student sex, the following trimmed regression model results:

Predicted values of "Math value" =

.16†G1 - .22*G3. (5)

R-squared for this regression model is .035 (overall N = 163). Mean predicted values derived from the standardized regression equation are displayed in Table 5B.

Although the effects on "Math value" are weak, they are generally consistent with expectations. "Math value" declines from upper-elementary classrooms to junior high school. There is no substantial mean difference in "Math value" between junior high school students, when students are aggregated into gross categories corresponding to heterogeneous versus homogeneous classrooms. Within

homogeneously-grouped junior high school classrooms, classroom ability-level is positively related to "Math value".

Discussion

These findings emphasize a need to differentiate various classroom social comparison behaviors of early adolescents. "Comparing math papers and report cards", "Competition", and "Investment in outperforming one's classmates" are factorially multi-dimensional and show distinct relationships to classroom variables associated with the transition into junior high school. "Comparing math papers and report cards" shows an expected increase from upper-elementary to junior high school classrooms. As expected, this social comparison behavior is also higher in heterogeneous compared to homogeneous junior high school classrooms, and it shows a modest positive relationship to classroom ability level within homogeneous ability-grouped junior high school classrooms. "Competition" and "Investment in outperforming one's classmates" do not show similar relations to grade level and between-classroom ability-grouping practices.

Classroom variables associated with the transition into junior high school may differentially affect these three social comparison composites because of the different functions of social comparison behavior to which the composites refer. The indicators of "Compare math grades and report cards" are not explicit about the function of

this social comparison behavior. It is possible that students examine their classmates' grades in math in order to evaluate their own ability, to evaluate their classmates' ability, or to find an exemplary student from whom one might learn how to improve one's own math skills. It is also possible that students look at their classmates' math grades for reasons that are not ability-related; for example, to strike up a conversation with an attractive classmate or to relieve boredom or frustration during the school day. On the other hand, indicators of "Competition" and "Investment in outperforming one's classmates" emphasize particular functions of social comparison behaviors while leaving unspecified the social comparison behaviors themselves. Implicit in trying to be the first one done in math is a social comparison act, alertness to relative speed of performance. Implicit in trying to do better than one's classmates in math is a social comparison act, attention to relative quality of performance within the classroom.

Expectancy-value theories of achievement motivation lead one to expect that declines in self-concept of math ability and math value, as observed here at the transition into junior high school, will lead to diminished long-term persistence in mathematics. If students believe that they must perform well in math in secondary school in order to have the opportunity to pursue math-related fields in college and careers, then believing that they are not capable of success in junior high school math should

diminish their motivation to continue in the multiple-step achievement path (Raynor, 1982). Declines in self-concept of math ability in junior high school should weaken students' resolve to continue taking math when it becomes an elective subject in high school. Similarly, Eccles et al. (1983) have found that math value is positively related to students' intentions to take more math when it becomes an elective in high school. By identifying modifiable classroom characteristics that bring about declines in self-concept of math ability and math value, one would hope that these trends could be countered.

Links between social comparison of abilities in the classroom, self-concept of ability, and task value require attention in future research.[2] On the one hand, positive covariation between social comparison behavior and self-concept of ability was hypothesized, insofar as high-ability students can both obtain accurate information about their abilities and maintain a favorable self-presentation through social comparison, whereas low-ability students can obtain accurate information about their abilities only at the expense of a favorable self-presentation. Similarly, positive covariation between social comparison and task value was hypothesized. Students who value an ability can be expected to value self-evaluation on that ability dimension; social comparison is one means of assessing one's own ability.

At first glance, these hypotheses do not square with trends observed at the transition into junior high school for social comparison behavior in mathematics classrooms, self-concept of math ability, and math value. Specifically, "comparing math grades and report cards" increased at the transition into junior high school, whereas self-concept of math ability and math value decreased. These trends would seem to suggest that "comparing math grades and report cards" is inversely related to self-concept of math ability and to math value. It is possible that structural changes in schools that occur at the transition into junior high school elevate mean levels of social comparison behaviors and lower mean levels of self-concept and task value, without changing the relative position of individuals on social comparison, self-concept, and task value dimensions. If this interpretation were correct, the magnitude of a (presumably positive) correlation between social comparison behavior and self-concept of ability (or task value) would stay constant over the period of the transition into junior high school, even though mean levels of social comparison behavior and self-concept (or task value) had moved in opposite directions. However, accepting this interpretation would also force one to conclude that the (positive) covariation between social comparison and self-concept of ability (or task value) does not result from a direct causal connection between those constructs. For instance, if the (positive) covariation between social comparison and self-

concept of ability had been the result of a direct causal path from self-concept to social comparison, then decreases in self-concept of ability, observed at the transition into junior high school, should have caused decreases in social comparison behavior, not the observed increases in social comparison behavior. Whether school structural changes produce changes in self-concept of math ability (or math value), that in turn produce changes in social comparison, or whether some other causal sequence exists, cannot be tested with the current cross-sectional data.

Future research on consequences of the transition into junior high school could be improved in at least two important ways. First, many of the intervening variables that have been included in this theoretical analysis have not been measured directly. If an argument suggests that the transition into junior high school increases student social comparison behavior because junior high school teachers are less familiar with their students individually and are more likely to evaluate them using normative performance standards in junior high school, then the intervening variables (teacher familiarity with students and teacher grading practices) should be measured directly. A second important means to improve future research on consequences of the transition into junior high school would be to frame such research in quasi-experimental designs (Cook and Campbell, 1979). In particular, making observations on the same students before and after they

experience the transition into junior high school would allow researchers to reach much less equivocal conclusions than is possible within the current cross-sectional design.

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Footnotes

[1]All regression analyses reported below with unit-weighted composites as dependent variables were also performed with single items as dependent variables. Effects found with the composite dependent variables were found with each of their component items as well.

[2]Unfortunately, indicators of social comparison and competition were often not included on the same questionnaire forms that included indicators of self-concept of math ability and math value. Because of this problem with non-overlapping forms, at least two-thirds and typically all upper-elementary students would be excluded from multivariate analyses involving indicators of both social comparison (or competition) and self-concept of math ability (or math value). Consequently, it is not possible here to analyze effects of the transition into junior high school, mediated by social comparison behavior, on self-concept of math ability (or math value). Similarly, it is not possible to analyze effects of the transition in junior high school, mediated by self-concept of math ability (or math value), on social comparison behavior.

Table 1

Number of Participants by Grade Level, Student Sex, and Ability-Grouping Practices in Math

Sex	Ability-Grouping in Math	Grade Level	
		Upper Elementary	Junior High School
Male	Heterogeneous	42	33
	Homogeneous: High	x	15
	Homogeneous: Regular	x	16
	Homogeneous: Low	x	22
Female	Heterogeneous	43	59
	Homogeneous: High	x	30
	Homogeneous: Regular	x	20
	Homogeneous: Low	x	11

Table 2

Indicators of Within-Classroom Social Comparison and Competition

	Response format
"Compare Math Papers and Report Cards"	
When math papers are handed back, we show each other how we did.	1=not very often 4=very often
When report cards come out, we tell each other what we got in math.	1=not very often 4=very often
"Competition"	
Some students in this class make fun of kids who answer math questions wrong or make mistakes.	1=not very often 4=very often
Some kids try to be the first ones to answer math questions the teacher asks.	1=not very often 4=very often
Some kids try to be the first ones done in math.	1=not very often 4=very often
"Investment in Outperforming Classmates"	
Doing better in math than other students in my classroom is important.	1=strongly disagree 7=strongly agree
I compare how hard I try in math to how hard other students try in my classroom.	1=never 7=very often
Trying harder in math than other students in my classroom is important to me.	1=strongly disagree 7=strongly agree

Table 3

Indicators of Self-Concept of Math Ability and Math Value

	Response format
"Self-Concept of Math Ability"	
How good at math are you?	1=not at all good 7=very good
If you were to rank all the students in your math class from the worst to the best in math, where would you put yourself?	1=the worst 7=the best
Compared to most of your other school subjects, how good are you at math?	1=much worse 7=much better
How well do you think you will do in math this year?	1=not at all well 7=very well
"Math Value"	
In general, how useful is what you learn in math?	1=not at all useful 7=very useful
Is the amount of effort it will take to do well in math this year worthwhile to you?	1=not very worthwhile 7=very worthwhile
For me, being good at math is	1=not at all important 7=very important

Table 4A

Mean Predicted Values of

"Compare Math Papers and Report Cards"

Sex	Ability-Grouping in Math	Grade Level	
		Upper Elementary	Junior High School
Male	Heterogeneous	-.76 (29)	.40 (33)
	Homogeneous: High	x	.19 (15)
	Homogeneous: Regular	x	-.06 (16)
	Homogeneous: Low	x	-.06 (22)
Female	Heterogeneous	-.76 (26)	.40 (59)
	Homogeneous: High	x	.19 (30)
	Homogeneous: Regular	x	-.06 (20)
	Homogeneous: Low	x	-.06 (11)

Note. Cell n's are in parentheses.

Table 4B

Mean Predicted Values of

"Competition"

Sex	Ability-Grouping in Math	Grade Level	
		Upper Elementary	Junior High School
Male	Heterogeneous	.58 (17)	.07 (33)
	Homogeneous: High	x	-.31 (15)
	Homogeneous: Regular	x	.30 (15)
	Homogeneous: Low	x	.85 (21)
Female	Heterogeneous	.22 (12)	-.28 (59)
	Homogeneous: High	x	-.67 (30)
	Homogeneous: Regular	x	-.06 (20)
	Homogeneous: Low	x	.50 (11)

Note. Cell n's are in parentheses.

Table 4C

Mean Predicted Values of

"Investment in Outperforming Classmates"

Sex	Ability-Grouping in Math	Grade Level	
		Upper Elementary	Junior High School
Male	Heterogeneous	-.11 (13)	.29 (20)
	Homogeneous: High	x	-.51 (10)
	Homogeneous: Regular	x	-.11 (11)
	Homogeneous: Low	x	-.11 (14)
Female	Heterogeneous	.09 (16)	-.15 (44)
	Homogeneous: High	x	.34 (20)
	Homogeneous: Regular	x	.09 (14)
	Homogeneous: Low	x	.09 (6)

Note. Cell n's are in parentheses.

Table 5A

Mean Predicted Values of

"Self-Concept of Math Ability"

Sex	Ability-Grouping in Math	Grade Level	
		Upper Elementary	Junior High School
Male	Heterogeneous	.35 (12)	-.02 (22)
	Homogeneous: High	x	.08 (11)
	Homogeneous: Regular	x	-.48 (10)
	Homogeneous: Low	x	-.02 (14)
Female	Heterogeneous	.35 (15)	-.02 (37)
	Homogeneous: High	x	.08 (20)
	Homogeneous: Regular	x	-.48 (12)
	Homogeneous: Low	x	-.02 (8)

Note. Cell n's are in parentheses.

Table 5B

Mean Predicted Values of

"Math Value"

Sex	Ability-Grouping in Math	Grade Level	
		Upper Elementary	Junior High School
Male	Heterogeneous	.26 (12)	-.01 (23)
	Homogeneous: High	x	.10 (11)
	Homogeneous: Regular	x	-.01 (10)
	Homogeneous: Low	x	-.40 (14)
Female	Heterogeneous	.26 (15)	-.01 (37)
	Homogeneous: High	x	.10 (20)
	Homogeneous: Regular	x	-.01 (13)
	Homogeneous: Low	x	-.40 (8)

Note. Cell n's are in parentheses.